JC19 Rec'd PCT/PTO 05 JUN 2001

FORM PTO-1390 (REV. 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371	West.6189
	U.S. APPLICATION NO. (If known, see 37 CFR 1.5 09/857474

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP99/09954	15 December 1999	18 December 1998

TITLE OF INVENTION
LOCAL VIDEO AND AUDIO NETWORK WITH OPTICAL DATA LINE

APPLICANT(S) FOR DO/EO/US
Harald SCHÖPP, Erich A. GEIGER, Detlef TEICHNER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [X] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [X] is attached hereto (required only if not communicated by the International Bureau).
   b. [ ] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [X] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. [X] is attached hereto.
   b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [X] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [X] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.
8. [X] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [X] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [X] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
14. [ ] A SECOND or SUBSEQUENT preliminary amendment.
15. [X] A substitute specification.
16. [ ] A change of power of attorney and/or address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [ ] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [X] Other items or information:
    -Copy of International Preliminary Examination Report in German;
    -Proposed Drawing Amendment;
    -Redlined copy of the FIGURE to show changes.

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U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/857474	PCT/EP99/09954	West.6189

				CALCULATIONS	PTO USE ONLY
21. [X] The following fees are submitted: **BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):**					
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**					
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860.00**					
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**					
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**					
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**					
ENTER APPROPRIATE BASIC FEE AMOUNT =				$ 860.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [X] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				$ 130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	$	
Total claims	14 - 20 =		x **$18.00**	$ 0	
Independent claims	2 - 3 =		x **$80.00**	$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$270.00**	$	
TOTAL OF ABOVE CALCULATIONS =				$ 990.00	
[ ] Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2. +				$	
SUBTOTAL =				$	
Processing fee of **$130.00** for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				$	
TOTAL NATIONAL FEE =				$ 990.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
TOTAL FEES ENCLOSED =				$ 990.00	
				Amount to be refunded:	$
				charged:	$

a. [X] A check in the amount of $ 990.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. ______ in the amount of $ ______ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-0079 . A duplicate copy of this sheet is enclosed.

d. [ ] Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

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Docket No.: West.6189

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Schöpp et al.

GROUP: Not yet assigned

INTERNATIONAL APPLN. NO.: PCT/EP99/09954

EXAMINER: Not yet assigned

SERIAL NO: Not yet assigned

INTERNATIONAL FILING DATE: 15 December 1999

FOR: LOCAL VIDEO AND AUDIO NETWORK WITH OPTICAL DATA LINE

PROPOSED DRAWING AMENDMENT

This proposed drawing amendment is respectfully requested to insert the number 100 in the FIGURE. A redlined copy of the FIGURE is enclosed herewith illustrating the proposed amendments.

If a telephone interview could assist in the prosecution of this application, please call the undersigned attorney.

Respectfully submitted,

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CERTIFICATE OF EXPRESS MAIL UNDER 37 C.F.R. §1.10

I hereby certify that this Information Disclosure Statement and the documents referred to as enclosed therein are being deposited with the United States Postal Service on June 5, 2001 in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EL715428951US addressed to the: Assistant Commissioner of Patents, Washington, D.C. 20231.

Amy M. Flick

Amy M. Flick

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Schöpp et al.

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FIRST PRELIMINARY AMENDMENT

Entry of this preliminary amendment is respectfully requested to eliminate multiple dependent claims, and to amend the specification.

Table of Contents:

Preliminary to calculation of the filing fee, please amend the above-identified application as follows:

Clean Copy of the Specification
Following Entry of this Amendment

09/857474
JC18 Rec'd PCT/PTO 05 JUN 2001

LOCAL VIDEO AND AUDIO NETWORK WITH AN OPTICAL DATA LINE

BACKGROUND OF THE INVENTION

The invention relates to the field of automotive multimedia systems, and in particular to an automotive multimedia system that includes a local network with several subscribers who are connected together into a ring network by an optical data line, to transmit audio and/or video data as well as control data.

Local networks with several subscribers who are connected together into a ring network by an optical data line, to transmit audio and/or video data as well as control data are known, for example, from the European Patent Application EP 519 111 B1. This local network has several subscribers, some of which generate audio or video data and control data, and feed these into the ring network. These subscribers are called data sources. Other subscribers to the network receive from the network the data intended for them, and then present the data to a user either by acoustic or visual reproduction. These subscribers are often referred to as data sinks. The known local networks have various data sources such as, for example, a car radio, CD player, DVD player, or a TV tuner, which transmit their data uncompressed over the optical data line to the appropriate data sink, for example a car amplifier to which several loudspeakers are connected, or a screen which displays the uncompressed FBAS video signal. The subscribers to such a network input their data to the network independently of one another and thus sometimes simultaneously, and withdraw the data in the same manner. Consequently, such a network can accommodate only a few subscribers since the transmission capacity of the network over the data line is limited.

Individual devices are known, for example a television, which have a TV tuner and picture

tube in a housing, and which are connected to one another via a data line. Uncompressed video signals are transmitted through this data line (e.g., as FBAS signals), and are displayed on the picture tube. Device combinations are also known, for example a DVD player with a television set. With this combination, the compressed data stored on the digital video disk (DVD), which are coded, among other ways, according to the MPEG-2 standard, are read out, are decoded by an appropriate MPEG-2 decoder in the DVD player and thus are decompressed. The decompressed data are then transmitted as decompressed data over the connecting lines to the standardized television set. The television set reproduces/displays these decompressed data, for example as an FBAS signal, in accordance with the video data received by the TV tuner.

A problem with the prior art systems is that the data on the data network are not compressed and thus inefficiently use the bandwidth of the data line and requires the data sources to provide decompressed data to the data sinks.

SUMMARY OF THE INVENTION

Briefly, according to an aspect of the present invention, a motor vehicle optical ring network includes an optical data line that defines a ring network, a playback transducer and at least one data source that is connected to the optical data line, and provides compressed data onto the optical data line. The network also includes at least one data sink that is connected to the optical data line, and receives the compressed data from the optical data bus and provides received compressed data indicative thereof. The data sink includes a bit stream decoder to decompress the received compressed data and provide a decompressed data signal indicative thereof to the playback transducer. The inventive local network is ideally suited for automotive application. It transmits audio data and video data in compressed form via the data line, and it has a single bit

stream decoder, centrally situated at the respective data sink, for decompressing the audio and video data conducted to it. This makes it possible to dispense with the decoders previously present at the various data sources, for example the bit stream decoder in the DVD player, which here is designed as an MPEG-2 decoder for the video data. For example, if several such data sources are to be arranged in a network, it is now possible to dispense with this plurality of bit stream decoders in the individual data sources and thus to reduce the costs of the network with its subscribers. Only at the relevant data sink is a single bit stream decoder present for decompressing the corresponding video data or audio data. As a result of this new realization, the individual components (i.e., the data sources) can now make do without their own bit stream decoder for decompressing the data. By the assignment of such a bit stream decoder centrally to the relevant data sink, the components of the individual subscribers are distributed in a new and better way in the network. Advantageously, this better utilizes the available data transmission capacity of the network, due to the transmission of compressed data instead of decompressed data. In addition, it greatly reduces the overall costs of the network. The various data sources can be implemented more economically at the expense of the data sinks, since the data sources can dispense with the cost-intensive bit stream decoders. Since an inventive local network regularly has a much larger number of data sources than data sinks, this results in the above-mentioned marked cost reduction.

In a preferred embodiment, the data sink with its bit stream decoder is designed separate from the data sources, and the compressed audio or video data are conducted to the data sink via the optical data line. This reduces the circuit complexity of the data sink, further reducing the costs of a network with such a data sink. This also ensures that all the compressed data conducted to the data sink are treated equally, and that no parallel inputted audio or video data are treated

preferentially.

The data connection between the data sources and the data sink with the bit stream decoder can be controlled by control data transmitted over the data line. This ensures reliable establishment of the data connections, the assignment of the data sink to the data sources, as well as control of the type of decompression. The bit stream decoder may be switched between several modes of decoding by the transmitted control data. This allows a single bit stream decoder to read several compressed data formats, and an appropriate switched state of the bit stream decoder can be chosen as needed (i.e., depending on the compressed data format used by the data source). The decoder may support video data compression formats such as MPEG-1, MPEG-2, and JPEG. Another bit stream decoder can be switched to decompress various audio compression formats (e.g., AC-3, MPEG-1, and MPEG-2). This can further reduce the number of required bit stream decoders. It has proven beneficial to dispense with a collection of decoders for compressed audio data and for compressed video data, since the compression methods used therein as well as the data structures for the audio and video data are too different, and the audio bit stream decoders and video bit stream decoders can be collected together only with very sophisticated organization and cost, which would by far cancel the theoretical cost advantage of further decoder reduction.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE illustrates a block diagram illustration of a local video and audio network with an optical data line.

DETAILED DESCRIPTION OF THE INVENTION

A local network 100 includes a plurality of subscribers 1-4 that are connected to one

another in a ring by an optical data line 5. Each of the subscribers 1-4 includes an associated interface 4-1, 4-2, 4-3, 4-4, respectively, and each interface includes two connections to the optical data line 5 to establish the ring.

Subscriber 1 is a car radio and forms a data source. This data source 1 receives a radio signal and delivers this either as uncompressed audio data via its interface 4-1 to the data line 5 and thus to the network for transmission to the associated data sink, or the audio signals of the radio program are conducted to an integrated bit stream encoder 10, which converts the audio signals into compressed audio data and transmits them, via the interface 4-1, to the optical data line 5. The AC-3 format is a suitable coding format for the audio signals.

Along with the audio data from the car radio 1, control data are also transmitted over the optical data line 5, which ensures the correct assignment of the audio data to the correct data sink (e.g., subscriber 3). In addition, an appropriate control signal ensures that the data sink 3 conducts the incoming data, inasmuch as these are transmitted as AC-3 compressed data, to the corresponding AC-3 bit stream decoder, which decompresses the data. If the audio data transmitted by the car radio 1 to the data sink 3 are not compressed, the bit stream decoder 6 will not be activated to decompress the audio data.

The data sink 3 contains an audio amplifier, which is connected via the interface 4-3 to the optical data line 5, and which obtains the audio data directed to it from this data line 5. Depending on the control data transmitted with the audio data, the audio data may also be processed in the amplifier 3. For example, this processing includes equalization, application of a delay, or signal amplification, which are enabled/disabled by the control signals transmitted over the network. In the present example, audio data compressed in the AC-3 format are transmitted by the car radio 1 via the optical data line 5 through the subscriber 2 to the amplifier 3, and there are decoded and

decompressed by the AC-3 bit stream decoder 6-3. Subsequently, they are, among other things, amplified, and then are conducted to the loudspeakers 9, which are connected to the amplifier 3, of which two units are shown by way of example.

In addition to the car radio 1, the local network 100 may include a second data source 2 such as a DVD player. This DVD player reads from a DVD both audio and video data in compressed form, and outputs the compressed audio and video data onto the data line 5 via its interface 4-2. Significantly, the DVD player 2 can dispense with any kind of bit stream decoder because, on the one hand, the audio and video data are to be transmitted in compressed form over the data line 5 and, on the other hand, an appropriate decoder is situated centrally in the data sinks 3, 4 to play back the audio and video data. Thus, the DVD player 2 can dispense with the expensive integrated circuits to decode the audio data, which here are present in the AC-3 format, and the video data, which here are present as MPEG-2 data. This is directly reflected in the form of a markedly reduced price for the DVD player.

The compressed audio and video data of the DVD player 2 are sent to the appropriate data sinks, which can be, on the one hand, the amplifier 3 described above and, on the other hand also the display screen unit 4. Only the display screen unit 4 needs to be considered as a data sink for video data. The unit 4 includes an interface 4-4, through which it is connected to the data line 5 on its input and output side, an MPEG-2 decoder 6-4 that decodes and thus decompresses the MPEG-2 coded video data transmitted to the display screen unit 4, and, for example, makes available uncompressed RGB signals to the display (e.g., a TFT) for playing back the video data. The display screen unit 4 includes a control unit 7, which on the one hand controls the display screen unit 4 by controlling the video data reproduction on the screen 8 (e.g., its brightness, contrast, and hue) and on the other hand adapts the function of the bit stream decoder 6-4 to the

format of the inputted video data. In this way, on the one hand the bit stream decoder can be turned off if non-coded video data are transmitted, or, on the other hand, an appropriate decoding function of the bit stream decoder can be chosen, in accordance with the incoming format (e.g., MPEG-1, MPEG-2, or the JPEG format). For example, MPEG-2 decoders can readily function as MPEG-1 decoders.

The control 7 not only can control the display screen unit 4, but can also control the local network and particularly the data channels for transmitting the audio and/or video data between the particular data sources and the particular data sink.

Depending on the control 7, the compressed audio data from the DVD player 2 are conducted via the optical data line 5 to the amplifier 3 or to the display screen unit 4, which has integrated loudspeakers in its display screen unit housing. By way of example, we shall assume that the control 7 has set an acoustic playback of the audio data through the amplifier unit 3. In this case, the compressed audio data are received via the optical data line 5 by the interface 4-3 of the amplifier 3, are conducted to the AC-3 bit stream decoder 6-3, which decodes and decompresses the compressed audio data and then conducts the uncompressed audio data to the amplifier stage of the amplifier 3. After the audio signals have been amplified, they are conducted to the loudspeakers 9.

This local network therefore shows how the data sources 1, 2 no longer require a stream decoder, and how the bit stream decoders 6-3, 6-4 are assigned to the data sinks 3, 4, which are centrally responsible for playing back the audio or video data. The example of the amplifier 3 clearly shows that it contains an AC-3 decoder 6-3 to decode the compressed audio data from the DVD player 2 and also from the car radio 1, and that these decoded audio data subsequently are reproduced by the loudspeakers 9. Through this centralization and assignment of the bit stream

decoders 6-3, 6-4 to the data sinks, the number of decoders can be greatly reduced. On the one hand, this noticeably reduces the costs of such a network even with a small number of subscribers. With a large number of subscribers, especially with an increasing number of data sources 1, 2, the achievable cost advantage becomes continuously greater.

Furthermore, this local network exhibits the possibility of much more efficiently utilizing the maximum transmission capacity of the optical data line 5, since now many more parallel data channels can be transmitted simultaneously. Through this combination of improving the transmission efficiency together with a marked cost reduction, an especially advantageous local network has been created.

Such a network is especially suited for use in an automobile, since in this application electromagnetic compatibility (e.g., optical data line 5), ease of installation (e.g., a single data line 5), and very low costs (e.g., reduction of the necessary bit stream decoders) with the same or greater functionality of the network are especially important. This increased functionality becomes especially clear with the simultaneous transmission of several video data channels, since these have enormous data quantities. It should also be noted that it is precisely video applications which are becoming more and more important in automobiles, and consequently special attention must be paid to transmission efficiency together with adequate reliability for automotive use.

What is claimed is:

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Before expiration of the time limit for modifications of the claims; publication will be repeated in case of modifications.

(54) Title: **LOCAL VIDEO AND AUDIO NETWORK WITH OPTICAL DATA LINE**

(57) Abstract

The invention relates to a local network, especially for automotive applications, with several subscribers that are connected with each other in a ring network by means of an optical data line (5) for transmitting audio and/or video data and control data. Several subscribers form data sources (1, 2) for compressed audio and/or video data and one or several subscribers (3, 4) form data sinks for the transmitted audio and/or video data. At least one data sink for compressed audio and/or video data contains a bit stream decoder (6-3, 6-4) that decodes the compressed audio and/or video data inputted via the data line (5), decompresses said data and plays back the audio and/or video data. By separately arranging the bit stream decoder from the data source, it is possible to assign several different data sources to said single decoder and to centrally utilize said bit stream decoder for the different data sources. This makes it possible to reduce network costs and to use the transmission capacity of the network in a more efficient manner by transmitting compressed data.

LOCAL VIDEO AND AUDIO NETWORK WITH AN OPTICAL DATA LINE

The invention relates to a local network with several subscribers who are connected together into a ring network by means of an optical data line, to transmit audio and/or video data as well as control data.

Local networks with several subscribers who are connected together into a ring network by means of an optical data line, to transmit audio and/or video data as well as control data are known, for example, from the EP 519 111 B1. This local network has several subscribers, some of which generate audio or video data and control data, and feed these into the ring network. These subscribers are called data sources. Other subscribers to the network take from the network the data intended for them, and cause these data to be displayed either by acoustic or visual reproduction. These subscribers are so-called data sinks. The known local networks have various data sources such as, for example, a car radio, CD player, DVD player, or also a TV tuner, which transmit their data uncompressed over the optical data line to the appropriate data sink, for example a car amplifier, to which several loudspeakers are connected, or a screen which displays the uncompressed FBAS video signal. The subscribers to such a network input their data to the network independently of one another and thus sometimes simultaneously, and likewise withdraw the data in the same manner. Consequently, such a network can accommodate only very few subscribers, since the transmission capacity of the network over the data line is limited.

Furthermore, individual devices are known, for example a television, which have a TV tuner and picture tube in a housing, and which are connected to one another via a data line. The video signals are transmitted uncompressed through this data line, for example as FBAS signals, and are displayed on the picture tube. But device combinations are also known, for example a DVD player together with a television set. With this combination, the compressed data stored on the digital video disk (DVD), which are coded, among other ways, according to the MPEG-2 standard, are read out, are decoded by an appropriate MPEG-2 decoder in the DVD player and thus are decompressed, and are transmitted as decompressed data over the connecting lines to the standardized television set.

The television set reproduces these decompressed data, for example as an FBAS signal, by means of the picture tube, in accordance with the video data received by the TV tuner.

It is the object of the invention to create a local network, especially for automotive applications, which on the one hand better utilizes the maximum transmission capacity and at the same time is as economical as possible.

The invention achieves this object by a local network with the characteristics of Claim 1.

Advantageous developments are specified in the subclaims.

The inventive local network is ideally suited for automotive application. It transmits audio data and video data in compressed form via the data line, and it has a single bit stream decoder, centrally situated at the respective data sink, for decompressing the audio and video data conducted to it. This makes it possible to dispense with the decoders previously present at the various data sources, for example the bit stream decoder in the DVD player, which here is designed as an MPEG-2 decoder for the video data. For example, if several such data sources are to be arranged in a network, it is now possible to dispense with this plurality of bit stream decoders in the individual data sources and thus to reduce the costs of the network with its subscribers. Only at the relevant data sink is a single bit stream decoder present for decompressing the corresponding video data or also audio data, so that typically the decoder components, which are very expensive and cost-intensive integrated circuits, are reduced to the absolutely necessary minimum. As a result of this new realization, the individual components, i.e. the data sources, can now make do without their own bit stream decoder for decompressing the data. By the assignment of such a bit stream decoder centrally to the relevant data sink, the components of the individual subscribers are distributed in a new and better way in the network. On the one hand, this better utilizes the available data transmission capacity of the network, due to the transmission of compressed data instead of decompressed data; on the other hand, it greatly reduces the overall costs of the network. The various data sources always can be implemented more economically at the expense of the data sinks, since the data sources can dispense with the cost-intensive bit

stream decoders. Since an inventive local network regularly has a much larger number of data sources than data sinks, this results in the above-mentioned marked cost reduction.

According to a preferred embodiment, the data sink with its bit stream decoder is designed separate from the data sinks, as a result of which all the compressed audio or video data are conducted to the data sink via the optical data line. This greatly reduces the circuit complexity of the data sink, thus further reducing the costs of a network with such a data sink. This also assures that all the compressed data conducted to the data sink are treated equally, and that no parallel inputted audio or video data are treated preferentially.

An especially beneficial design of the invention makes it possible that the data connection between the data sources and the data sink with the bit stream decoder can be controlled by means of control data transmitted over the data line. This assures reliable establishment of the data connections, the assignment of the data sink to the data sources, as well as control of the type of decompression. It has proven especially beneficial to switch the bit stream decoder between several modes of decoding function by means of the transmitted control data. In this way, a single bit stream decoder can read several compressed data formats, and an appropriate switched state of the bit stream decoder can be chosen as needed, i.e. depending on the compressed data format used by the data source, and the data in this compressed data format can be correctly decompressed with the chosen decoding function. It has proven beneficial to provide a decoder for video data compression formats which typically comprise the MPEG-1 format, the MPEG-2 format, and also the JPEG format. Correspondingly, another bit stream decoder can also be switched for decompressing various audio compression formats (e.g. AC-3, MPEG-1, and MPEG-2). This can further reduce the number of required bit stream decoders. It has proven beneficial to dispense with a collection of decoders for compressed audio data and for compressed video data, since the compression methods used therein as well as the data structures for the audio and video data are too different, and the audio bit stream decoders and video bit stream decoders can be collected together only with very sophisticated organization and therefore

cost, which would by far cancel the theoretical cost advantage of further decoder reduction.

A preferred embodiment of the invention is shown in Figure 1 and will be explained in more detail below.

The local network has four subscribers 1, 2, 3, 4, which are connected to one another in a ring by an optical data line 5. Each subscriber 1, 2, 3, 4 has an interface 4-1, 4-2, 4-3, 4-4 with respectively two connections to the optical data line 5.

Subscriber 1 is a car radio and forms a data source. This data source 1 receives a radio signal and delivers this either as uncompressed audio data, via its interface 4-1, to the data line 5 and thus to the network for transmission to the associated data sink, or the audio signals of the radio program are conducted to an integrated bit stream encoder 10, which converts the audio signals into compressed audio data and transmits them, via the interface 4-1, to the optical data line 5. The AC-3 format has turned out to be a suitable coding format for the audio signals.

Besides the audio data of the car radio 1, control data are also transmitted over the optical data line, which assures the correct assignment of the audio data to the correct data sink, namely subscriber 3. In addition, an appropriate control signal assures that the data sink 3 conducts the incoming data, inasmuch as these are transmitted as AC-3 compressed data, to the corresponding AC-3 bit stream decoder, which accomplishes decompression of the data. If the audio data are transmitted uncompressed by the car radio 1 to the data sink 3, the bit stream decoder 6 will not be activated to function.

The data sink 3 contains an audio amplifier, which is connected via an interface 4-3 to the optical data line 5, and which obtains the audio data directed to it from this data line 5. Depending on the control data transmitted together with the audio data, the audio data are further processed in the amplifier 3. For example, this processing includes equalization, application of a delay, or signal amplification, all these processes being controlled by the control signals transmitted over the network. In the present example, therefore, audio data

compressed in the AC-3 format are transmitted by the car radio 1, via the optical data line 5, through the subscriber 2, to the amplifier 3, and there are decoded and thus decompressed by the AC-3 bit stream decoder 6-3. Subsequently, they are, among other things, amplified, and then are conducted to the loudspeakers 9, which are connected to the amplifier 3, of which two units are shown by way of example.

Besides the car radio 1, there is a second data source 2, namely a DVD player. This DVD player can take from the DVD both audio and video data in compressed form, and can place these audio and video data without any further processing in the sense of decompression on its interface 4-2, to be conducted to the data line 5. This clearly shows that the DVD player 2 can dispense with any kind of bit stream decoder because, on the one hand, the audio and video data are to be transmitted in compressed form over the data line 5 and, on the other hand, an appropriate decoder is situated centrally in the data sink 3, 4 to play back the audio and video data. Thus, the DVD player 2 can dispense with the expensive integrated circuits to decode the audio data, which here are present in the AC-3 format, and the video data, which here are present as MPEG-2 data. This is directly reflected in the form of a markedly reduced price for the DVD player.

The unchanged compressed audio and video data of the DVD player 2 are sent to the appropriate data sinks, which can be, on the one hand, the amplifier 3 described above and, on the other hand also the display screen unit 4. Only the display screen unit 4 needs to be considered as a data sink for video data. It has an interface 4-4, through which it is connected to the data line 4 on its input and output side, further an MPEG-2 decoder 6-4, which decodes and thus decompresses the MPEG-2 coded video data transmitted to the display screen unit 4, and, for example, makes them available as uncompressed RGB signals to the TFT display for playing back the video data. Furthermore, the display screen unit 4 has a control unit 7, which on the one hand controls the display screen unit 4, by controlling the video data reproduction on the screen 8 as regards its brightness, contrast, and hue, and on the other hand also adapts the function of the bit stream decoder 6-4 to the format of the inputted video data. In this way, on the one hand the bit stream decoder can be turned off if non-coded video data are transmitted, or, on the other hand, an appropriate decoding function of the bit

stream decoder can be chosen, in accordance with the incoming format, for example, MPEG-1, MPEG-2, or the JPEG format. For example, MPEG-2 decoders can readily function as MPEG-1 decoders.

The control 7 not only can control the display screen unit 4 but can also control the local network and particularly the data channels for transmitting the audio and/or video data between the particular data sources and the particular data sink.

Depending on the control 7, the compressed audio data from the DVD player 2 are conducted via the optical data line 5 either to the amplifier 3 or to the display screen unit 4, which has integrated loudspeakers in its display screen unit housing. By way of example, we shall assume that the control 7 has set an acoustic playback of the audio data through the amplifier unit 3. In this case, the compressed audio data are received via the optical data line 5 by the interface 4-3 of the amplifier 3, are conducted to the AC-3 bit stream decoder 6-3, which decodes and decompresses the compressed audio data and then conducts the uncompressed audio data to the amplifier stage of the amplifier 3. After the audio signals have been amplified, they are conducted to the loudspeakers 9.

This local network therefore shows how the data sources 1, 2 can dispense with any bit stream decoder whatsoever, and how the bit stream decoders 6-3, 6-4 are assigned to the data sinks 3, 4, which are centrally responsible for playing back the audio or video data. The example of the amplifier 3 clearly shows that it contains an AC-3 decoder 6-3 to decode the compressed audio data from the DVD player 2 and also from the car radio 1, and that these decoded audio data subsequently are reproduced by means of the loudspeakers 9. Through this centralization and assignment of the bit stream decoders 6-3, 6-4 to the data sinks, the number of decoders can be greatly reduced. On the one hand, this noticeably reduces the costs of such a network even with a small number of subscribers. With a large number of subscribers, especially with an increasing number of data sources 1, 2, the achievable cost advantage becomes continuously greater.

Furthermore, this local network exhibits the possibility of much more efficiently utilizing the maximum transmission capacity of the optical data line 5, since now

many more parallel data channels can be transmitted simultaneously. Through this combination of improving the transmission efficiency together with a marked cost reduction, an especially advantageous local network has been created.

Such a network is especially suited for use in an automobile, since in this application electromagnetic compatibility (optical data line 5), ease of installation (a single data line 5), and very low costs (reduction of the necessary bit stream decoders) with the same or greater functionality of the network are especially important. This increased functionality becomes especially clear with the simultaneous transmission of several video data channels, since these have enormous data quantities. It should also be noted that it is precisely video applications which are becoming more and more important in automobiles, and consequently special attention must be paid to transmission efficiency together with adequate reliability for automotive use.

List of Reference Symbols

1	Subscriber, data source, car radio
2	Subscriber, data source, DVD player
3	Subscriber, data sink, amplifier
4	Subscriber, data sink, display screen unit
4-1	Interface
4-2	Interface
4-3	Interface
4-4	Interface
5	Optical data line
6-3	AC-3 decoder of the amplifier 3
6-4	Bit stream decoder of the display screen unit 4
7	Control
8	Screen
9	Loudspeaker
10	AC-3 encoder

CHANGED PAGE

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New Claims

1. An local ring network with an optical data line (5), to which are connected several data sources (1, 2) for outputting compressed audio and/or video data and at least one data sink (3, 4) for receiving the transmitted audio and/or video data, as well as with bit stream decoders (6-3, 6-4), characterized in that exclusively the data sinks (3, 4) each have a bit stream decoder (6-3, 6-4) for decompressing the data transmitted by the data sources (1, 2), and that within each of the data sinks (3, 4) a single such bit stream decoder is situated for decompressing the compressed data transmitted over the optical data line (5).

2. The local network of Claim 1, characterized in that the data sink (3, 4) with the bit stream decoder (6-3, 6-4) is separate from the data sinks (1, 2) and is connected to them via the optical data line (5).

3. The local network of Claim 1 or 2, characterized by a control (7), which controls the data connection between a data source (1, 2) for compressed audio and/or video data and the data sink (3, 4) with the bit stream decoder (6-3, 6-4).

4. The local network of one of the preceding claims, characterized in that the bit stream decoder (6-3, 6-4) is an MPEG-1 decoder, an MPEG-2 decoder, an AC-3 decoder, and/or a JPEG coder.

5. The local network of one of the preceding claims, characterized in that the bit stream decoder (6-4) can be switched by transmitted control data to function as an MPEG-1 decoder, an MPEG-2 decoder, or a JPEG decoder.

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Clean Copy of the Claims

Following Entry of This Amendment

--6. A motor vehicle optical ring network, comprising:

an optical data line that defines a ring network;

a playback transducer;

at least one data source that is connected to said optical data line, and provides compressed data onto said optical data line; and

at least one data sink that is connected to said optical data line, and receives said compressed data from said optical data bus and provides received compressed data indicative thereof, wherein said data sink includes a bit stream decoder to decompress said received compressed data and provide a decompressed data signal indicative thereof to said playback transducer.--

--7. The motor vehicle optical ring network of claim 6, wherein said bit stream decoder includes means for decompressing video data.--

--8. The motor vehicle optical ring network of claim 7, wherein said bit stream decoder includes means for decompressing audio data.--

--9. The motor vehicle optical ring network of claim 8, wherein said playback transducer includes at least one loudspeaker.--

--10. The motor vehicle optical ring network of claim 7, wherein said playback transducer includes a video display.--

--11. The motor vehicle optical ring network of claim 7, wherein said bit stream decoder

includes an MPEG decoder, a JPEG decoder and an AC-3 decoder.--

--12. The motor vehicle optical ring network of claim 8, wherein said at least one data source includes a radio tuner.--

--13. The motor vehicle optical ring network of claim 12, comprising a second data source that includes a DVD player that is connected to said optical data line and provides compressed data onto said optical data line.--

--14. The motor vehicle optical ring network of claim 13, wherein said bit stream decoder is selectively configured as an MPEG decoder, a JPEG decoder or an AC-3 decoder in response to control signal data received by said bit stream decoder over said optical data line.--

--15. A optical ring network for a motor vehicle multimedia system, comprising:

an optical data line that defines a ring network;

a playback transducer;

a video display;

a first data source that is connected to said optical data line, and provides compressed audio data onto said optical data line;

a second data source that is connected to said optical data line, and provides compressed video data onto said optical data line;

a video display device that is connected to said optical data line, and receives said compressed video data from said optical data bus and provides received compressed video data indicative thereof, wherein said video display device includes a first bit stream decoder to decompress said received compressed video data and provide a decompressed video data signal

indicative thereof for display by said video display device; and

an audio playback device that is connected to said optical data line, and receives said compressed audio data from said optical data bus and provides received compressed audio data indicative thereof, wherein said audio playback device includes a second bit stream decoder to decompress said received compressed audio data and provide a signal indicative of said decompressed audio data signal indicative thereof to said a playback transducer.

--16. The optical ring network of claim 15, wherein said first bit stream decoder includes means for decoding MPEG and AC-3 data.--

--17. The optical ring network of claim 16, wherein said second bit stream decoder includes means for decoding MPEG and JPEG data.--

--18. The optical ring network of claim 17, wherein said first data source includes a radio tuner.--

--19. The optical ring network of claim 18, wherein said second data source includes a digital video disc (DVD) player.--

REMARKS

Claims 1-5 have been cancelled. Claims 6-19 have been added. Claims 6-19 remain.

The specification has been amended following the translation of the application to English.

Examination on the merits is respectfully requested.

If a telephone interview could assist in the prosecution of this application, please call the undersigned attorney.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

Cancel claims 1-5.

~~1. An local ring network with an optical data line (5), to which are connected several data sources (1, 2) for outputting compressed audio and/or video data and at least one data sink (3, 4) for receiving the transmitted audio and/or video data, as well as with bit stream decoders (6-3, 6-4), characterized in that exclusively the data sinks (3, 4) each have a bit stream decoder (6-3, 6-4) for decompressing the data transmitted by the data sources (1, 2), and that within each of the data sinks (3, 4) a single such bit stream decoder is situated for decompressing the compressed data transmitted over the optical data line (5).~~

~~2. The local network of Claim 1, characterized in that the data sink (3, 4) with the bit stream decoder (6-3, 6-4) is separate from the data sinks (1, 2) and is connected to them via the optical data line (5).~~

~~3. The local network of Claim 1 or 2, characterized by a control (7), which controls the data connection between a data source (1, 2) for compressed audio and/or video data and the data sink (3, 4) with the bit stream decoder (6-3, 6-4).~~

~~4. The local network of one of the preceding claims, characterized in that the bit stream decoder (6-3, 6-4) is an MPEG-1 decoder, an MPEG-2 decoder, an AC-3 decoder, and/or a JPEG~~

~~coder.~~

~~5. The local network of one of the preceding claims, characterized in that the bit stream decoder (6-4) can be switched by transmitted control data to function as an MPEG-1 decoder, an MPEG-2 decoder, or a JPEG decoder.~~

--6. A motor vehicle optical ring network, comprising:

an optical data line that defines a ring network;

a playback transducer;

at least one data source that is connected to said optical data line, and provides compressed data onto said optical data line; and

at least one data sink that is connected to said optical data line, and receives said compressed data from said optical data bus and provides received compressed data indicative thereof, wherein said data sink includes a bit stream decoder to decompress said received compressed data and provide a decompressed data signal indicative thereof to said playback transducer.--

--7. The motor vehicle optical ring network of claim 6, wherein said bit stream decoder includes means for decompressing video data.--

--8. The motor vehicle optical ring network of claim 7, wherein said bit stream decoder includes means for decompressing audio data.--

--9. The motor vehicle optical ring network of claim 8, wherein said playback transducer includes at least one loudspeaker.--

--10. The motor vehicle optical ring network of claim 7, wherein said playback transducer includes a video display.--

--11. The motor vehicle optical ring network of claim 7, wherein said bit stream decoder includes an MPEG decoder, a JPEG decoder and an AC-3 decoder.--

--12. The motor vehicle optical ring network of claim 8, wherein said at least one data source includes a radio tuner.--

--13. The motor vehicle optical ring network of claim 12, comprising a second data source that includes a DVD player that is connected to said optical data line and provides compressed data onto said optical data line.--

--14. The motor vehicle optical ring network of claim 13, wherein said bit stream decoder is selectively configured as an MPEG decoder, a JPEG decoder or an AC-3 decoder in response to control signal data received by said bit stream decoder over said optical data line.--

--15. A optical ring network for a motor vehicle multimedia system, comprising:

an optical data line that defines a ring network;

a playback transducer;

a video display;

a first data source that is connected to said optical data line, and provides compressed audio data onto said optical data line;

a second data source that is connected to said optical data line, and provides compressed video data onto said optical data line;

a video display device that is connected to said optical data line, and receives said compressed video data from said optical data bus and provides received compressed video data indicative thereof, wherein said video display device includes a first bit stream decoder to decompress said received compressed video data and provide a decompressed video data signal indicative thereof for display by said video display device; and

an audio playback device that is connected to said optical data line, and receives said compressed audio data from said optical data bus and provides received compressed audio data indicative thereof, wherein said audio playback device includes a second bit stream decoder to decompress said received compressed audio data and provide a signal indicative of said decompressed audio data signal indicative thereof to said a playback transducer.

--16. The optical ring network of claim 15, wherein said first bit stream decoder includes means for decoding MPEG and AC-3 data.--

--17. The optical ring network of claim 16, wherein said second bit stream decoder includes means for decoding MPEG and JPEG data.--

--18. The optical ring network of claim 17, wherein said first data source includes a radio tuner.-

--19. The optical ring network of claim 18, wherein said second data source includes a digital video disc (DVD) player.--

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(54) Title: **LOCAL VIDEO AND AUDIO NETWORK WITH OPTICAL DATA LINE**

(57) Abstract

The invention relates to a local network, especially for automotive applications, with several subscribers that are connected with each other in a ring network by means of an optical data line (5) for transmitting audio and/or video data and control data. Several subscribers form data sources (1, 2) for compressed audio and/or video data and one or several subscribers (3, 4) form data sinks for the transmitted audio and/or video data. At least one data sink for compressed audio and/or video data contains a bit stream decoder (6-3, 6-4) that decodes the compressed audio and/or video data inputted via the data line (5), decompresses said data and plays back the audio and/or video data. By separately arranging the bit stream decoder from the data source, it is possible to assign several different data sources to said single decoder and to centrally utilize said bit stream decoder for the different data sources. This makes it possible to reduce network costs and to use the transmission capacity of the network in a more efficient manner by transmitting compressed data.

LOCAL VIDEO AND AUDIO NETWORK WITH AN OPTICAL DATA LINE

The invention relates to a local network with several subscribers who are connected together into a ring network by means of an optical data line, to transmit audio and/or video data as well as control data.

Local networks with several subscribers who are connected together into a ring network by means of an optical data line, to transmit audio and/or video data as well as control data are known, for example, from the EP 519 111 B1. This local network has several subscribers, some of which generate audio or video data and control data, and feed these into the ring network. These subscribers are called data sources. Other subscribers to the network take from the network the data intended for them, and cause these data to be displayed either by acoustic or visual reproduction. These subscribers are so-called data sinks. The known local networks have various data sources such as, for example, a car radio, CD player, DVD player, or also a TV tuner, which transmit their data uncompressed over the optical data line to the appropriate data sink, for example a car amplifier, to which several loudspeakers are connected, or a screen which displays the uncompressed FBAS video signal. The subscribers to such a network input their data to the network independently of one another and thus sometimes simultaneously, and likewise withdraw the data in the same manner. Consequently, such a network can accommodate only very few subscribers, since the transmission capacity of the network over the data line is limited.

Furthermore, individual devices are known, for example a television, which have a TV tuner and picture tube in a housing, and which are connected to one another via a data line. The video signals are transmitted uncompressed through this data line, for example as FBAS signals, and are displayed on the picture tube. But device combinations are also known, for example a DVD player together with a television set. With this combination, the compressed data stored on the digital video disk (DVD), which are coded, among other ways, according to the MPEG-2 standard, are read out, are decoded by an appropriate MPEG-2 decoder in the DVD player and thus are decompressed, and are transmitted as decompressed data over the connecting lines to the standardized television set.

The television set reproduces these decompressed data, for example as an FBAS signal, by means of the picture tube, in accordance with the video data received by the TV tuner.

It is the object of the invention to create a local network, especially for automotive applications, which on the one hand better utilizes the maximum transmission capacity and at the same time is as economical as possible.

The invention achieves this object by a local network with the characteristics of Claim 1.

Advantageous developments are specified in the subclaims.

The inventive local network is ideally suited for automotive application. It transmits audio data and video data in compressed form via the data line, and it has a single bit stream decoder, centrally situated at the respective data sink, for decompressing the audio and video data conducted to it. This makes it possible to dispense with the decoders previously present at the various data sources, for example the bit stream decoder in the DVD player, which here is designed as an MPEG-2 decoder for the video data. For example, if several such data sources are to be arranged in a network, it is now possible to dispense with this plurality of bit stream decoders in the individual data sources and thus to reduce the costs of the network with its subscribers. Only at the relevant data sink is a single bit stream decoder present for decompressing the corresponding video data or also audio data, so that typically the decoder components, which are very expensive and cost-intensive integrated circuits, are reduced to the absolutely necessary minimum. As a result of this new realization, the individual components, i.e. the data sources, can now make do without their own bit stream decoder for decompressing the data. By the assignment of such a bit stream decoder centrally to the relevant data sink, the components of the individual subscribers are distributed in a new and better way in the network. On the one hand, this better utilizes the available data transmission capacity of the network, due to the transmission of compressed data instead of decompressed data; on the other hand, it greatly reduces the overall costs of the network. The various data sources always can be implemented more economically at the expense of the data sinks, since the data sources can dispense with the cost-intensive bit

stream decoders. Since an inventive local network regularly has a much larger number of data sources than data sinks, this results in the above-mentioned marked cost reduction.

According to a preferred embodiment, the data sink with its bit stream decoder is designed separate from the data sinks, as a result of which all the compressed audio or video data are conducted to the data sink via the optical data line. This greatly reduces the circuit complexity of the data sink, thus further reducing the costs of a network with such a data sink. This also assures that all the compressed data conducted to the data sink are treated equally, and that no parallel inputted audio or video data are treated preferentially.

An especially beneficial design of the invention makes it possible that the data connection between the data sources and the data sink with the bit stream decoder can be controlled by means of control data transmitted over the data line. This assures reliable establishment of the data connections, the assignment of the data sink to the data sources, as well as control of the type of decompression. It has proven especially beneficial to switch the bit stream decoder between several modes of decoding function by means of the transmitted control data. In this way, a single bit stream decoder can read several compressed data formats, and an appropriate switched state of the bit stream decoder can be chosen as needed, i.e. depending on the compressed data format used by the data source, and the data in this compressed data format can be correctly decompressed with the chosen decoding function. It has proven beneficial to provide a decoder for video data compression formats which typically comprise the MPEG-1 format, the MPEG-2 format, and also the JPEG format. Correspondingly, another bit stream decoder can also be switched for decompressing various audio compression formats (e.g. AC-3, MPEG-1, and MPEG-2). This can further reduce the number of required bit stream decoders. It has proven beneficial to dispense with a collection of decoders for compressed audio data and for compressed video data, since the compression methods used therein as well as the data structures for the audio and video data are too different, and the audio bit stream decoders and video bit stream decoders can be collected together only with very sophisticated organization and therefore

cost, which would by far cancel the theoretical cost advantage of further decoder reduction.

A preferred embodiment of the invention is shown in Figure 1 and will be explained in more detail below.

The local network has four subscribers 1, 2, 3, 4, which are connected to one another in a ring by an optical data line 5. Each subscriber 1, 2, 3, 4 has an interface 4-1, 4-2, 4-3, 4-4 with respectively two connections to the optical data line 5.

Subscriber 1 is a car radio and forms a data source. This data source 1 receives a radio signal and delivers this either as uncompressed audio data, via its interface 4-1, to the data line 5 and thus to the network for transmission to the associated data sink, or the audio signals of the radio program are conducted to an integrated bit stream encoder 10, which converts the audio signals into compressed audio data and transmits them, via the interface 4-1, to the optical data line 5. The AC-3 format has turned out to be a suitable coding format for the audio signals.

Besides the audio data of the car radio 1, control data are also transmitted over the optical data line, which assures the correct assignment of the audio data to the correct data sink, namely subscriber 3. In addition, an appropriate control signal assures that the data sink 3 conducts the incoming data, inasmuch as these are transmitted as AC-3 compressed data, to the corresponding AC-3 bit stream decoder, which accomplishes decompression of the data. If the audio data are transmitted uncompressed by the car radio 1 to the data sink 3, the bit stream decoder 6 will not be activated to function.

The data sink 3 contains an audio amplifier, which is connected via an interface 4-3 to the optical data line 5, and which obtains the audio data directed to it from this data line 5. Depending on the control data transmitted together with the audio data, the audio data are further processed in the amplifier 3. For example, this processing includes equalization, application of a delay, or signal amplification, all these processes being controlled by the control signals transmitted over the network. In the present example, therefore, audio data

compressed in the AC-3 format are transmitted by the car radio 1, via the optical data line 5, through the subscriber 2, to the amplifier 3, and there are decoded and thus decompressed by the AC-3 bit stream decoder 6-3. Subsequently, they are, among other things, amplified, and then are conducted to the loudspeakers 9, which are connected to the amplifier 3, of which two units are shown by way of example.

Besides the car radio 1, there is a second data source 2, namely a DVD player. This DVD player can take from the DVD both audio and video data in compressed form, and can place these audio and video data without any further processing in the sense of decompression on its interface 4-2, to be conducted to the data line 5. This clearly shows that the DVD player 2 can dispense with any kind of bit stream decoder because, on the one hand, the audio and video data are to be transmitted in compressed form over the data line 5 and, on the other hand, an appropriate decoder is situated centrally in the data sink 3, 4 to play back the audio and video data. Thus, the DVD player 2 can dispense with the expensive integrated circuits to decode the audio data, which here are present in the AC-3 format, and the video data, which here are present as MPEG-2 data. This is directly reflected in the form of a markedly reduced price for the DVD player.

The unchanged compressed audio and video data of the DVD player 2 are sent to the appropriate data sinks, which can be, on the one hand, the amplifier 3 described above and, on the other hand also the display screen unit 4. Only the display screen unit 4 needs to be considered as a data sink for video data. It has an interface 4-4, through which it is connected to the data line 4 on its input and output side, further an MPEG-2 decoder 6-4, which decodes and thus decompresses the MPEG-2 coded video data transmitted to the display screen unit 4, and, for example, makes them available as uncompressed RGB signals to the TFT display for playing back the video data. Furthermore, the display screen unit 4 has a control unit 7, which on the one hand controls the display screen unit 4, by controlling the video data reproduction on the screen 8 as regards its brightness, contrast, and hue, and on the other hand also adapts the function of the bit stream decoder 6-4 to the format of the inputted video data. In this way, on the one hand the bit stream decoder can be turned off if non-coded video data are transmitted, or, on the other hand, an appropriate decoding function of the bit

stream decoder can be chosen, in accordance with the incoming format, for example, MPEG-1, MPEG-2, or the JPEG format. For example, MPEG-2 decoders can readily function as MPEG-1 decoders.

The control 7 not only can control the display screen unit 4 but can also control the local network and particularly the data channels for transmitting the audio and/or video data between the particular data sources and the particular data sink.

Depending on the control 7, the compressed audio data from the DVD player 2 are conducted via the optical data line 5 either to the amplifier 3 or to the display screen unit 4, which has integrated loudspeakers in its display screen unit housing. By way of example, we shall assume that the control 7 has set an acoustic playback of the audio data through the amplifier unit 3. In this case, the compressed audio data are received via the optical data line 5 by the interface 4-3 of the amplifier 3, are conducted to the AC-3 bit stream decoder 6-3, which decodes and decompresses the compressed audio data and then conducts the uncompressed audio data to the amplifier stage of the amplifier 3. After the audio signals have been amplified, they are conducted to the loudspeakers 9.

This local network therefore shows how the data sources 1, 2 can dispense with any bit stream decoder whatsoever, and how the bit stream decoders 6-3, 6-4 are assigned to the data sinks 3, 4, which are centrally responsible for playing back the audio or video data. The example of the amplifier 3 clearly shows that it contains an AC-3 decoder 6-3 to decode the compressed audio data from the DVD player 2 and also from the car radio 1, and that these decoded audio data subsequently are reproduced by means of the loudspeakers 9. Through this centralization and assignment of the bit stream decoders 6-3, 6-4 to the data sinks, the number of decoders can be greatly reduced. On the one hand, this noticeably reduces the costs of such a network even with a small number of subscribers. With a large number of subscribers, especially with an increasing number of data sources 1, 2, the achievable cost advantage becomes continuously greater.

Furthermore, this local network exhibits the possibility of much more efficiently utilizing the maximum transmission capacity of the optical data line 5, since now

many more parallel data channels can be transmitted simultaneously. Through this combination of improving the transmission efficiency together with a marked cost reduction, an especially advantageous local network has been created.

Such a network is especially suited for use in an automobile, since in this application electromagnetic compatibility (optical data line 5), ease of installation (a single data line 5), and very low costs (reduction of the necessary bit stream decoders) with the same or greater functionality of the network are especially important. This increased functionality becomes especially clear with the simultaneous transmission of several video data channels, since these have enormous data quantities. It should also be noted that it is precisely video applications which are becoming more and more important in automobiles, and consequently special attention must be paid to transmission efficiency together with adequate reliability for automotive use.

List of Reference Symbols

1	Subscriber, data source, car radio
2	Subscriber, data source, DVD player
3	Subscriber, data sink, amplifier
4	Subscriber, data sink, display screen unit
4-1	Interface
4-2	Interface
4-3	Interface
4-4	Interface
5	Optical data line
6-3	AC-3 decoder of the amplifier 3
6-4	Bit stream decoder of the display screen unit 4
7	Control
8	Screen
9	Loudspeaker
10	AC-3 encoder

Claims

1. A local network with several subscribers (1, 2, 3, 4), which are connected into a ring network by means of an optical data line (5), to transmit audio and/or video data as well as control data, such that several subscribers (1, 2) are data sources for compressed audio and/or video data, and at least one subscriber (3, 4) is a data sink for the transmitted audio and/or video data, and such that a bit stream decoder (6-3, 6-4) is present, which is part of the data sink (3, 4), and which can be assigned to several data sources (1, 2), and which decodes the compressed audio and/or video data that are transmitted to the data sink (3, 4).

2. The local network of Claim 1, characterized in that the data sources (1, 2) do not have a bit stream decoder (6-3, 6-4).

3. The local network of Claim 1 or 2, characterized in that the data sink (3, 4) with the bit stream decoder (6-3, 6-4) is separate from the data sinks (1, 2) [sic - should be sources] and is connected to them via the optical data line (5).

4. The local network of one of the preceding claims, characterized by a control (7), which controls the data connection between a data source (1, 2) for compressed audio and/or video data and the data sink (3, 4) with the bit stream decoder (6-3, 6-4).

5. The local network of one of the preceding claims, characterized by the bit stream decoder (6-3, 6-4) being an MPEG-1 decoder, an MPEG-2 decoder, an AC-3 decoder, and/or a JPEG decoder.

6. The local network of one of the preceding claims, characterized in that the bit stream decoder (6-4) can be switched as an MPEG-1 decoder, an MPEG-2 decoder, or a JPEG decoder by means of transmitted control data.

PCT

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(81) **Bestimmungsstaaten:** JP, KR, US, europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

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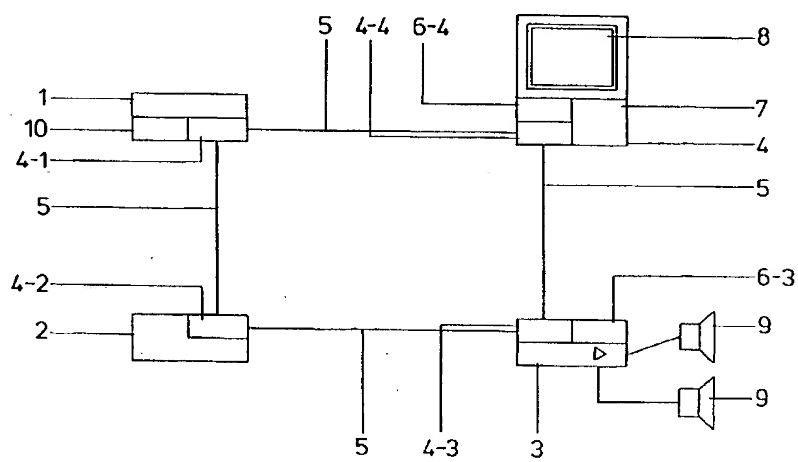
Mit internationalem Recherchenbericht.
Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist; Veröffentlichung wird wiederholt falls Änderungen eintreffen.

(54) **Title:** LOCAL VIDEO AND AUDIO NETWORK WITH OPTICAL DATA LINE

(54) **Bezeichnung:** LOKALES VIDEO– UND AUDIO– NETZWERK MIT OPTISCHE DATENLEITUNG

(57) **Abstract**

The invention relates to a local network, especially for automatic utilization with several subscribers that are connected with each other in a ring network by means of an optical data line (5) for transmitting audio and/or video data and control data. Several subscribers form data sources (1, 2) for compressed audio and/or video data and one or several subscribers (3, 4) form data sinks for the transmitted audio and/or video data. At least one data sink for compressed audio and/or video data contains a bit stream decoder (6–3, 6–4) that decodes the compressed audio and/or video data inputted via the data line (5), decompresses said data and plays back the audio and/or video data. By separately arranging the bit stream decoder from the data source, it is possible to assign several different data sources to said single decoder and to centrally utilize said bit stream decoder for the different data sources. This makes it possible to reduce network costs and to use the transmission capacity of the network in a more efficient manner by transmitting compressed data.



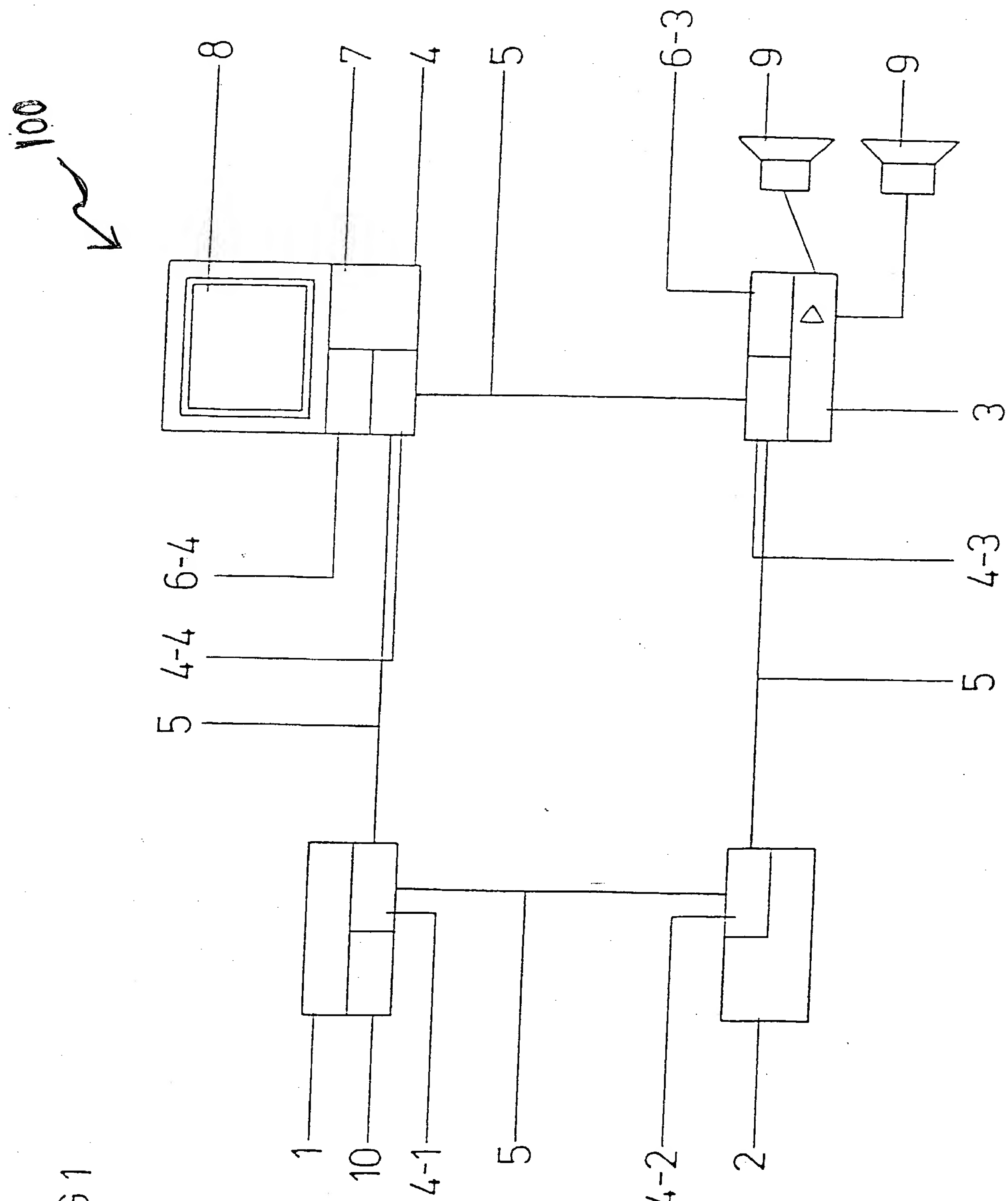


FIG 1

Docket No: West.6189

DECLARATION AND POWER OF ATTORNEY

We, the below named inventors, hereby declare that:

Our residences, post office addresses, and citizenships are as stated below next to our respective names.

We believe we are the original, first, and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled LOCAL VIDEO AND AUDIO NETWORK WITH OPTICAL DATA LINE, filed June 5, 2001 and designated Serial No. 09/857,474.

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims.

We acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations, Section 1.56.

We hereby claim foreign priority benefits under Title 35, United States Code §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by us on the same subject matter having a filing date before that of the application(s) on which priority is claimed: German Application No. 198 58 493.8 filed December 18, 1998, and International Application No. PCT/EP99/09954 filed December 15, 1999.

We hereby declare that all statements are made hereby of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And we hereby appoint:

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all of the firm of Samuels, Gauthier & Stevens, our attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

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